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8 **BEFORE THE**
9 **CALIFORNIA STATE WATER RESOURCES CONTROL BOARD**

10 HEARING IN THE MATTER OF
11 CALIFORNIA DEPARTMENT OF WATER
12 RESOURCES AND UNITED STATES
13 BUREAU OF RECLAMATION
14 REQUEST FOR A CHANGE IN POINT OF
15 DIVERSION FOR CALIFORNIA
16 WATERFIX

REBUTTAL TESTIMONY OF THOMAS C.
CANNON ON PART 2 ISSUES:
EFFECTS ON FISH AND WILDLIFE
PUBLIC TRUST
PUBLIC INTEREST

17 I, Thomas C. Cannon, do hereby declare:

18 **I. Introduction**

19 I, Thomas C. Cannon, am a retired environmental consultant and have worked on many
20 issues related to Central Valley water projects over the past 40 years. My statement of
21 qualifications is Exhibit CSPA-7.

22 My Part 2 rebuttal testimony responds to the testimony presented in the Department of
23 Water Resources’ (DWR) case-in-chief by Dr. Marin Greenwood (Exhibits DWR-1012 and
24 DWR-1029) and by Dr. Richard Wilder (Exhibits DWR-1013-signed and DWR-1070). My
25 testimony accomplishes this response primarily by responding to these witnesses’ oral
26 presentations of their testimony on February 23, 2018.

27 Both Dr. Greenwood and Dr. Wilder based the opinions in their testimony in part on the
28 National Marine Fisheries Service’s Biological Opinion for WaterFix (“NMFS BO”, Exhibit
SWRCB-106), the U.S. Fish and Wildlife Service’s Biological Opinion for WaterFix (“FWS

1 BO”, Exhibit SWRCB-105), and the California Department of Fish and Wildlife’s Incidental
2 Take Permit For WaterFix (“ITP”, Exhibit SWRCB-107).

3 Some of my rebuttal testimony rebuts foundational testimony in the NMFS BO or uses
4 statements from the NMFS BO to rebut Dr. Greenwood and Dr. Wilder in their reference to the
5 that document/exhibit.

6 The overall purpose of my testimony is to rebut the statements of Dr. Greenwood and Dr.
7 Wilder that the California WaterFix, if constructed and operated with the constraints proposed or
8 suggested by DWR, would reasonably protect fish.

9 **II. General response to Dr. Greenwood and Dr. Wilder**

10 Dr. Greenwood and Dr. Wilder testified that CWA H3+ provides reasonable protection
11 for fish based on fulfillment of WaterFix federal biological opinions, the state’s incidental take
12 permit, and Decision 1641 criteria/standards, and their own effects analyses conducted with
13 extensive collaboration, review, and feedback provided by FWS, NMFS, DFW, DWR, and
14 Reclamation, as well as added project refinements including:

- 15 • New North Delta Diversion (NDD) bypass flows
- 16 • New October-June OMR restrictions
- 17 • New south Delta (SD) export constraints
- 18 • Updated spring outflow criteria
- 19 • Adaptive management of criteria

- 20
- 21 1. The NMFS and FWS biological opinions for WaterFix provide incidental take permits
22 (ITP’s) for listed salmon, sturgeon, and smelt, but also state that WaterFix will have
23 adverse effects on the listed species. Dr. Greenwood and Dr. Wilder do not address the
24 gravely depressed population status of these species, the adverse effects of WaterFix, or
25 how recovery may be accomplished. The federal Endangered Species Act (ESA)
26 requires permittees to address recovery of listed species and contribute actions that will
27 lead to recovery.
- 28

- 1 2. Dr. Greenwood and Dr. Wilder state that WaterFix will meet standards in the existing
2 BO's for the State Water Project (SWP) and Central Valley Project (CVP), water quality
3 standards, and criteria stated in water rights orders. Such criteria have been ignored or
4 weakened in recent years to accommodate water supply demands. Dr. Greenwood and
5 Dr. Wilder failed to recognize this or address how criteria will be met in the face of high
6 water demands.
- 7 3. New project refinements in the five categories listed above address issues raised so far in
8 the permitting process, but in many cases lack vital details and are vague as to their
9 potential resolution of recognized project impacts or their negative effect on project-
10 derived water supply.
- 11 4. Dr. Greenwood and Dr. Wilder do not address how new NDD bypass flows protect
12 salmon migrations or Low Salinity Zone habitat compared to existing conditions.
- 13 5. Dr. Greenwood and Dr. Wilder do not address how "new" OMR restrictions or SD export
14 restrictions will be protective given reductions in Delta inflow from the NDD.
- 15 6. Dr. Greenwood and Dr. Wilder do not address how adaptive management will have
16 authority to make changes needed in future.

17 **III. Specific Responses to the Oral Presentations of Testimony by Dr. Greenwood**
18 **and Dr. Wilder**

19 In this portion of my testimony, I respond to Dr. Greenwood and Dr. Wilder's oral
20 summary testimony on February 23, 2018. I first quote a statement of the witness (in italics),
21 citing to the page(s) and line(s) of the hearing transcript, and then I present my rebuttal of that
22 statement.

23 **A. Response to the Oral Presentation of Testimony by Dr. Greenwood**

24 **1. Response to Dr. Greenwood's Presentation on Delta Smelt and Longfin Smelt**

25
26 **Dr. Greenwood statement:** "*[O]perational decisions are triggered by -- often are*
27 *triggered by or made based upon real-time assessment of fish distributions within the Delta or*
28 *adjacent areas through the Delta.*" (HT, 2/23/18, p. 108:3-6)

1 **Response:** The record over the past three decades clearly indicates this is not the case.
2 On rare occasions in the past, exports were restricted based on salvage, screw trap catches, or
3 real-time monitoring for Delta smelt adults in the central Delta. Recommendations from the
4 Smelt Working Group to restrict operations were often not implemented by management.

5
6 **Dr. Greenwood statement:** *“It’s my opinion that Delta Smelt and Longfin Smelt will be*
7 *reasonably protected by CWF H3+ ... because the existing protection from South Delta*
8 *entrainment risk will be maintained and potentially increased because of the construction and*
9 *operation of the North Delta diversions, as I’ll discuss.”* (HT, 2/23/18, p. 109:13-14, 17-21)

10 **Response:** If anything, existing OMR restrictions on south Delta exports would likely be
11 unchanged, and further exports from the NDD would occur, adding to total exports up to the E/I
12 limit.

13
14 **Dr. Greenwood statement:** *“[T]he North Delta diversions will be screened to fish*
15 *agency protective standards.”* (HT, 2/23/18, p. 109:22-23)

16 **Response:** There are no proven standards for larval fish or juvenile fish potentially
17 subjected to very large screens such as those proposed for CWF.

18
19 **Dr. Greenwood statement:** *““Delta Smelt fall rearing habitat will be reasonably*
20 *protected in my opinion, because of the inclusion of the fall outflow or Fall X2 criteria from the*
21 *Fish and Wildlife Service Biological Opinion currently in place.”* (HT, 2/23/18, p. 110:3-7)

22 **Response:** The Fall X2 criteria only apply in wet years, and the FWS allowed an
23 exemption to the requirement in 2017, the most recent wet year.

24
25 **Dr. Greenwood statement:** *“Longfin Smelt will be reasonably protected by DWF H3+*
26 *through the inclusion of Spring Outflow Criteria developed in coordination with the Department*
27 *of Fish and Wildlife.”* (HT, 2/23/18, p. 110:8-11)

1 **Response:** The California Department of Fish and Wildlife (CDFW) prescribed no
2 change in Delta outflow to the Bay in the ITP. DWR has not agreed to the prescription, only to
3 negotiate (coordinate) with CDFW. Winter outflow is equally if not more important for longfin
4 than spring outflow, because winter is the larval rearing period in the Bay-Delta estuary. Larvae
5 are pelagic and subject to drifting into the Delta during periods of low outflow. Diversions from
6 the NDD may be limited during some flow pulses, but nothing would otherwise prevent the
7 NDD from drawing larval smelt into the Delta. This effect would be most likely in drier years.

8
9 **Dr. Greenwood statement:** *“The protection from South Delta entrainment risk will be
10 maintained or potentially increased above the existing levels.”* (HT, 2/23/18, p. 111:4-7)

11 **Response:** Though some reduction in south Delta exports would occur under high NDD
12 diversions, reductions in Delta inflow will increase the effects of the remaining south Delta
13 exports.

14
15 **Dr. Greenwood statement:** *“[T]here will be a number of pre- and post-construction
16 studies which will be used to . . . to develop the final design of the facilities in order to be
17 protective of Salmonids and Green Sturgeon and other species, as well as post-construction
18 studies that will be used to assess the effects once they're built and operated in order to assess
19 the need for any adaptive management decisions to be made regarding the evidence for any
20 effects that are in place after the operations begin.”* (HT, 2/23/18, p. 111:9-18)

21 **Response:** The concept of studying design elements sounds good, but the design is
22 already very advanced and state of the art. There is not much to be done except pray it works.
23 If it doesn't, then the likely outcome will be strongly limiting use and operation. People forget
24 that the original State Water Project built 11,000 cfs of pumping capacity with only slightly
25 more than half ever being used (CWF needs no new pumps). The adaptive management element
26 will be in constant conflict between environmental and water supply beneficial uses. There have
27 been limited pre-project surveys on what to expect. No specific post-project assessment
28

1 program has been provided. There are proposals for studies of entrainment or impingement;
2 such studies are the norm for new water diversions around the country.

3
4 **Dr. Greenwood statement:** *“There will be loss of habitat because of the construction of*
5 *the facilities. The footprints of the facilities will occupy habitat that otherwise fish could*
6 *occupy, and so there will be shallow water and tidal habitat restoration of 1,828 acres,*
7 *approximately, which will be to offset the loss of habitat. And that restoration must occur prior*
8 *to the loss of habitat taking place.”* (HT, 2/23/18, p. 116:7-14)

9 **Response:** How do we know that the new habitats wherever they are will serve the same
10 function and value? Are the proposed restoration areas already planned as existing mitigation
11 requirements?

12
13 **Dr. Greenwood statement:** *“The CWF H3+ operational criteria includes the protective*
14 *Old and Middle River flow criteria from the 2008-2009 Fish and Wildlife Service and National*
15 *Marine Fisheries Service Biological Opinions.”* (HT, 2/23/18, p. 117:3-6)

16 **Response:** OMR restrictions in the existing BO’s for the operation of the SWP and CVP
17 have not been protective for either listed salmon or Delta smelt, but they have restricted Delta
18 exports. Adding the NDD would alleviate the effects of these restrictions on water supply and
19 allow greater total exports. Lowering Delta outflow in winter and spring would further
20 compromise salmon and smelt. Furthermore, reductions in Delta inflow because of North Delta
21 diversions will create a new interior Delta hydraulic regime that reduces the potential benefit of
22 OMR protections.

23
24 **Dr. Greenwood statement:** *“[W]ith the construction and operation of the North Delta*
25 *diversions, there will be less South Delta pumping which, therefore, has the potential to reduce*
26 *entrainment.”* (HT, 2/23/18, p. 117:7-10)

27 **Response:** The NDD allows capture of flows that otherwise would be unavailable to
28 south Delta exports. There may be times when capacity will exceed available supply, and there

1 will be tradeoffs between the new NDD and the old SDD; in such cases, diversions at the SDD
2 could be less than might otherwise occur. SD diversions are already restricted in winter-spring,
3 and less so in summer. Winter-spring is the most likely tradeoff period when diversions might
4 be reduced at the SDD. In such case, SDD would be lessened, but the possibility of NDD
5 entrainment/impingement would be added, along with potential SDD entrainment effects due to
6 decreased inflow because of diversions at the NDD. The potential reduction in SDD
7 entrainment is marginal at best, with significant overall added potential risk to Delta fishes,
8 depending on circumstances. The overall risk carries considerable uncertainty because of
9 potential undefined or unrecognized losses at the NDD intakes.

10
11 **Dr. Greenwood statement:** “[T]hings like South Delta entrainment are managed in
12 *real-time.*” (HT, 2/23/18, p. 118:12-13)

13 **Response:** Salvage numbers at times may trigger changes in export rates, especially if the
14 numbers approach take limits in BO’s. However, entrainment through the SDD screens is
15 generally not monitored or used to manage Delta operations. The distribution of Delta smelt
16 larvae within Delta channels as determined by CDFW surveys may influence Delta operations.

17
18 **Dr. Greenwood statement:** “[T]he North Delta diversions are upstream of the main
19 *range of where the Smelts occur.*” (HT, 2/23/18, p. 123:22-23)

20 **Response:** CDFW larval, fall midwater trawl, townet, and 20-mm surveys do not extend
21 upstream in the Delta channel of the Sacramento River into the area of the CWF intakes.
22 USFWS seine surveys cover the intake area and regularly capture Delta smelt.

23
24 **Dr. Greenwood statement:** “*But for those Smelts that are occurring in that area, the*
25 *North Delta diversions will be designed to fish agency protective standards*” ... line 10: “*That*
26 *opening, based on analyses, would prevent entrainment of Smelts that are greater than about 21*
27 *to 22 millimeters.*” (HT, 2/23/18, p. 124:2-4;10-12)

1 **Response:** Any smelt spawned above or in the area of the intakes would likely occur in
2 the larval or early juvenile stages, which are 5 to 20 millimeters in length.

3
4 **Dr. Greenwood statement:** *“This recognizes there is a potential for this passage to be*
5 *potentially restricted by the North Delta diversions.”* (HT, 2/23/18, p. 125:2-4)

6 **Response:** With lower net outflow below the CWF diversions, there will be a greater
7 potential for adult smelt to tidally surf upstream into the diversion reach and spawn.

8
9 **Dr. Greenwood statement:** *“[L]ower-velocity habitat will be eliminated because the*
10 *fish screens are intended to have relatively rapid sweeping velocities in order to meet*
11 *downstream passage criteria for juvenile Salmonids in that stream.”* (HT, 2/23/18, p. 126:25 to
12 127:3)

13 **Response:** Low velocity habitat would occur during slack and incoming tides.

14
15 **Dr. Greenwood statement:** *“[T]he potential for passage is greatly reduced with -- if*
16 *attempting to move along one of those screen faces because of the relative -- relatively high*
17 *velocities.”* (HT, 2/23/18, p. 127:6-9)

18 **Response:** WaterFix intends to operate on flood tides when NDD’s gravity-fed
19 diversions will have the greatest diversion rate.

20
21 **Dr. Greenwood statement:** *“[I]t's my opinion that there'll be reasonable protection*
22 *from the passage restriction because there'll be about 1750 acres of habitat provided as*
23 *mitigation downstream of the North Delta diversions in order to account for the increase that*
24 *potentially wouldn't be accessible upstream of the North Delta diversions.”* (HT, 2/23/18, p.
25 128:7-12)

26 **Response:** There is no basis for claiming there is a passage restriction for Delta smelt,
27 nor is there a basis that 1750 acres of habitat will mitigate for the impacts to Delta smelt that do
28 enter the area of the NDD.

1
2 **Dr. Greenwood statement:** *“It's my opinion that CWF H3+ reasonably protects Delta Smelt*
3 *fall rearing habitat because it includes the Fall X2 criteria from the Fish and Wildlife Service 2008*
4 *Biological Opinion.”* (HT, 2/23/18, p. 128:18-21)

5 **Response:** Fall X2 criteria only apply in wet years, and the USFWS has shown a
6 willingness to relax the criteria (fall 2017).

7
8 **Dr. Greenwood statement:** *“Adaptive Management Program for CWF will address the*
9 *uncertainty in the summer rearing habitat of Delta Smelt in order to provide operations that will*
10 *be protective at the time the operations actually begin of CWF.”* (HT, 2/23/18, p. 129:17-21)

11 **Response:** This statement implies diversions may be operated differently when Delta
12 smelt are found in the area of the diversions, yet no criteria are given.

13
14 **Dr. Greenwood statement:** *“And I would note also, as I do in my written testimony,*
15 *that there are -- there are other processes as well that will be addressing the issue of summer*
16 *outflow, for example, under the Delta Smelt resiliency strategy.”* (HT, 2/23/18, p. 129:22-130:1)

17 **Response:** The 2008 Delta Smelt BO has no summer outflow criteria. The FWS BO for
18 WaterFix does mention the need for summer outflow protection. The Delta Smelt Resilience
19 Strategy includes a provision for buying summer outflow water from willing sellers. Summer
20 operations criteria should be defined.

21
22 **Dr. Greenwood statement:** *“[P]rovision and assessment of additional summer outflows*
23 *is something that has been proposed, and also that the -- the 2008-2009 Biological Opinion*
24 *reconsultation as well may be considering outflow during these other times of the year.”* (HT,
25 2/23/18, p. 130:2)

26 **Response:** Summer outflow criteria are being proposed because existing
27 standards/criteria for outflow and salinity were not adhered to in recent multi-year droughts;
28 thus, lack of summer outflow contributed to the population decline in Delta smelt.

1
2 **Dr. Greenwood statement:** *“Longfin Smelt will be reasonably protected by CWF H3+ because of the inclusion of Spring Outflow Criteria that, as I mentioned earlier, were developed in coordination with the Department of Fish and Wildlife through the Incidental Take Permit Application process.”* (HT, 2/23/18, p. 130:10-14)

3
4
5
6 **Response:** The ITP recognizes the need to maintain outflow throughout both winter and spring to protect longfin smelt. Longfin larvae are prevalent throughout the estuary during all the winter months. They require outflow protection to ensure they are not transported into the central and south Delta and to maintain their habitat.

7
8
9
10
11 **Dr. Greenwood statement:** *“There is a positive relationship between winter/spring Delta outflow, actually expressed as X2, and abundance indices of Longfin Smelt.”* (HT, 2/23/18, p. 130:15-17)

12
13
14 **Response:** This statement is still further evidence that winter outflow criteria for longfin smelt are also important.

15
16
17 **Dr. Greenwood statement:** *“[DWR predicted]abundance for Longfin Smelt as a function of mean January to June X2. The yellow highlighted box shows that, with the Proposed Project -- which as I mentioned in this case was actually CWF H3+ modeled -- that there will be little difference between the No-Action Alternative and the Proposed Project, which in my opinion indicates reasonable protection of Longfin Smelt.”* (HT, 2/23/18, p. 131:1-8)

18
19
20
21
22 **Response:** The CWF intakes would be operated primarily in the winter-spring and would reduce outflow to the Bay. Mr. Miller (DWR-1025) presented figures (slides 9, 11, and 13) showing up to 800,000 acre-ft of project yield during the winter of 2016. That water would come from existing outflow, much of it in January and February, which would have potential adverse effects on longfin smelt.

1 **Dr. Greenwood statement:** *“Essentially what we're doing is comparing these scenarios*
2 *to a baseline that includes the Biological Opinions, National Marine Fisheries Service and U.S.*
3 *Fish and Wildlife Service 2008-2009 Biological Opinions, which essentially are meeting*
4 *standards for Endangered Species Act, as well as the criteria from the Bay-Delta Water Quality*
5 *Control Plan under D-1641.”* (HT, 2/23/18, p. 131:12-19)

6 **Response:** The existing criteria have not been adhered to and have not been adequately
7 protective of the listed species.

8
9 **Dr. Greenwood statement:** *“The first one is water temperature. An assessment was*
10 *done of the water temperature effects using DSM-II QUAL model. And this showed that there'll*
11 *be little difference between the CWF H3+ and the No-Action Alternative, the main driver on*
12 *water temperature within the Delta being the atmospheric conditions, rather than water*
13 *operations.”* (HT, 2/23/18, p. 132:15-21)

14 **Response:** Reduction in flow below the NDD will result in higher water temperatures in
15 the Delta due to several factors. The low salinity zone will be further east in higher air
16 temperatures. There will be less influence of the cooler Sacramento River water and more of the
17 warmer San Joaquin water, as pointed out by Dr. Bryan in his testimony. Longer residence time
18 of water below the NDD in more northerly and easterly areas of the Delta will result in higher
19 water temperatures, especially in the Cache Slough area. A more detailed discussion is provided
20 in Exhibit CSPA-463.

21
22 **Dr. Greenwood statement:** *“It's my opinion that Delta Smelt will be reasonably*
23 *protected because a Sediment Reintroduction Plan to mitigate sediment entrainment at the*
24 *North Delta diversions, essentially returning sediment to the Delta.”* (HT, 2/23/18, p. 133:1-5)

25 **Response:** Sediment will be lost to the NDD and will settle out more below the diversion.
26 The form of the sediment (e.g., organic, inorganic, sand, silt, etc.) will be important as it
27 performs differing roles. Large inputs of sediment will be costly and require extensive
28 permitting on a case-by-case basis.

1 **Dr. Greenwood statement:** *“There is a potential for microcystis to be affected by the*
2 *operations of CWF H3+. For example, through less South Delta export pumping in the*
3 *summertime.”* (HT, 2/23/18, p. 133:6-9)

4 **Response:** With the greater influence of the San Joaquin River and longer residence time
5 in the Delta of that water, NDD could increase noxious blooms.

6
7 **Dr. Greenwood statement:** *“And also it was discussed qualitatively that the entrainment*
8 *of the North Delta diversions had the potential to offset or perhaps even more than offset by the*
9 *in situ productions or the production of these materials within the Delta, as well as South Delta*
10 *export pumping being reduced and, therefore, allowing a greater potential contribution from the*
11 *San Joaquin River, which is relatively rich in those types of materials compared to other parts*
12 *of the Delta, like the Sacramento River.”* (HT, 2/23/18, p. 134:2-11)

13 **Response:** The composition/communities of plankton, including both phyto- and zoo-
14 types, are very complex, but tend to be highly influenced seasonally by freshwater input to the
15 Delta. Productivity is likely to be lower with the loss of freshwater inflow at the NDD. A more
16 detailed analysis is provided in CSPA-503.

17 **2. Response to Dr. Greenwood’s Presentation on Salmonids and Sturgeon**

18
19 **Dr. Greenwood statement:** *“[T]he CWF H3+ will be reasonably protective of*
20 *Salmonids and Green Sturgeon because it will maintain or potentially increase entrainment*
21 *protection from South Delta entrainment.”* (HT, 2/23/18, p. 137:1-4)

22 **Response:** The listed salmonids and green sturgeon are found mainly in the Sacramento
23 River watershed and thus are less likely to encounter the SDD facilities. However, they are
24 highly likely to encounter the NDD and thus will have higher potential overall risk. Those that
25 pass the NDD will also be more susceptible to SDD with lower Delta inflow.

26
27 **Dr. Greenwood statement:** *“[T]he Old and Middle River flow criteria will be in place*
28 *from the 2008-2009 Biological Opinions, and with the construction and operation of the North*

1 *Delta diversions, this will give less South Delta pumping and, therefore, the potential for less*
2 *entrainment, recognizing that that is something that is managed in real-time.” (HT, 2/23/18, p.*
3 *137:5-12)*

4 **Response:** The OMR criteria will be unchanged, but will be operated under lower Delta
5 inflow because of the NDD, which will increase entrainment at SDD. OMR criteria are
6 managed in real time and could be adjusted to allow greater or lesser SDD diversions.

7
8 **Dr. Greenwood statement:** *“It's my opinion that Salmonids and Green Sturgeon will be*
9 *reasonably protected from the North Delta diversion effects because of the screening, as well as*
10 *the – the numerous pre- and post-construction studies that will be undertaken to inform the final*
11 *design, as well as to assess the effects following operation -- testing and operation of these*
12 *intakes, North Delta diversions.” (HT, 2/23/18, p. 137:15-22)*

13 **Response:** Salmonid and sturgeon fry will be highly susceptible to fatigue and
14 impingement on the very large screens. Predation is a serious concern. Larvae and early
15 juvenile sturgeon will be highly susceptible to entrainment, first by being present during
16 expected heavy winter-spring operation, and second due to their poor swimming ability. See
17 exhibits CSPA-400, CSPA-401, CSPA-402 and CSPA-403.

18 The NMFS BO for WaterFix describes the risk of entrainment to salmonids:

19 Loss of habitat complexity at the NDD sites will also likely degrade migratory PBFs for
20 juveniles, as this will increase the risk of predation and impingement within the NDD
21 structural footprint. The PA describes the incorporation of refugia along the NDD screens
22 that may provide additional minimization to screen impingement and associated
23 predation risk. Phased testing and operation of the three NDD intakes will ensure that the
24 screens are functioning to NMFS screening criteria. (Exhibit SWRCB-106, p. 879)

25 Neither the NMFS BO nor Dr. Greenwood discusses the uncertainty of the structural
26 design, whether testing of already-built screens can resolve the issues, or whether NMFS's
27 screen criteria themselves are protective.

28 The NMFS BO for WaterFix also discusses the risk of entrainment for green sturgeon:

1 Likewise, the entrainment and impingement threat to salmonids at the NDD screens is
2 most likely not an issue for sturgeon. If debris loading becomes an issue at the screens,
3 then juvenile sturgeon could become impinged but this is expected to be rare situation
4 when the Sacramento River is at high flood stage. Because green sturgeon are
5 benthically-oriented fish and juveniles are larger than juvenile salmonids, activities in the
6 PA that may increase predation of salmonids are less of a concern for green sturgeon.
7 (Exhibit SWRCB-106, p. 879)

8 From March-May, small sturgeon, smaller than young salmonids and smelt, show in
9 Delta, moving downstream after being born in spring in the lower Sacramento River. They may
10 be less vulnerable during flood flows, but that would not be the case during the far more
11 frequent periods when flow pulses are not occurring. During these periods of relatively low
12 flow, benthic orientation would provide little protection from the deep intakes of the NDD and
13 the predators drawn to the area. Both the NMFS BO and Dr. Greenwood fail to address these
14 issues.

15 The NMFS BO also discusses the effect of flow reductions on Bay rearing by juvenile
16 salmon.

17 This analysis indicates there would be some loss in potential for fry or immature smolts
18 to use the Bay for rearing in some months under the PA by decreasing the average
19 monthly outflow under 20,000 cfs thereby, increasing or maintaining salinities over 20
20 ppt (Table 2-241) which contributes to degradation of this PBF [physical or biological
21 feature]. Effects on Bay outflow and salinity also include slightly reducing the frequency
22 of average monthly outflow over 38,000 cfs, which historically has been associated with
23 fry presence in the Bay (Redler et al. 2016). While fry presence or absence in the Bay is
24 associated with multiple factors, it is nevertheless important to recognize that outflow is a
25 metric to detect system-wide changes in hydrology under the scenarios that could impact
26 fry movement and rearing potential in the Bay. (Exhibit SWRCB-106, p. 875)

27 The NMFS BO recognized that lower outflows with WaterFix would results in less
28 rearing of salmonids in the Bay. Such rearing is beneficial. Dr. Greenwood fails to address this
29 issue.

30 **Dr. Greenwood statement:** *“The approach velocity, as I mentioned, is 0.2 feet per
31 second. This is a, as I mentioned, Fish and Wildlife Service-recommended criterion for Delta
32*

1 *Smelt and is more protective than the .33 feet per second standard for juvenile Salmonids,*
2 *Salmonid fry, from NMFS, National Marine Fisheries Service.” (HT, 2/23/18, p. 138:6-11)*

3 **Response:** These criteria were designed for much smaller intakes – there are unlikely to
4 protect salmon and sturgeon fry or larval and juvenile splittail, sturgeon, smelt, and striped bass.

5
6 **Dr. Greenwood statement:** *“And the sweeping velocity for the screens is required to be*
7 *at least two times the approach velocity. This is a standard from Department of Fish and*
8 *Wildlife and it is -- it is intended to limit the potential passage time that it takes for juvenile*
9 *Salmonids to move downstream past the screens.” (HT, 2/23/18, p. 138:12-17)*

10 **Response:** The sweeping velocity will change with tide stage, being near zero on slack
11 tides except during high flows.

12
13 **Dr. Greenwood statement:** *“These screens are large, and there's three of them. There*
14 *is uncertainty regarding the potential for effect from the screens.” (HT, 2/23/18, p. 138:18-20)*

15 **Response:** Dr. Greenwood understates the potential ramifications of the uncertainty.

16
17 **Dr. Greenwood statement:** *“I shouldn't say there's uncertainty regarding the potential*
18 *for effect. There is the potential for effect, but a number of pre- and post-construction studies*
19 *will be undertaken, as I'll describe in a – in a moment, that will reduce the uncertainty and that*
20 *effect by informing the final design to be as protective as possible, but also allowing assessment*
21 *of the screens once they are constructed and operated in order to -- to assess what effects*
22 *they're actually having once being -- once being built and operated.” (HT, 2/23/18, p. 138:21 -*
23 *p. 139:5)*

24 **Response:** The studies mentioned have yet to be defined, and thus there is no way to
25 evaluate their potential effectiveness or whether the studies could lead to refinements that could
26 reduce uncertainty. Studies would likely be too late to respond to negative assessment once the
27 screens were built and operating, unless options are built into the designs. Such options, if any,
28 have not been articulated.

1
2 **Dr. Greenwood statement:** *It's my opinion that the Salmonids and Green Sturgeon will*
3 *be reasonably protected by the North Delta diversion Bypass Flow Criteria, real-time*
4 *operational adjustments, as well as mitigation that will be undertaken.*” (HT, 2/23/18, p.
5 142:16-20)

6 **Response:** There are no guarantees that these measures could reasonably protect salmon,
7 smelt, and other fishes from losses at the NDD screens.

8
9 **Dr. Greenwood statement:** *“And there's also protection of, for example, pulses of fish*
10 *moving into -- It's recognized that fish move into the Delta in pulses which are associated with*
11 *large pulses of flow and, therefore, there are criteria to protect those pulses of -- of fish, for*
12 *example, by limiting the amount of diversion to minimal – to minimal amounts.”* (HT, 2/23/18,
13 p.142:24 – p 143:5)

14 **Response:** The NDD may increase the risks to migrating salmonids between pulses.
15 There are additional risks, some of which the NMFS BO describes as follows:

16 The impacts to juvenile rearing habitat in the vicinity of the NDD as described in Section
17 2.5.2.2.2 are likely to result in some degradation to migratory PBFs for juvenile life
18 stages in that area for all three salmonid species. Increased predation risk, risk of
19 impingement, loss of habitat complexity, and reduced river flows are all stressors that
20 may reduce juvenile survival during outmigration, thus degrading PBFs related to
21 migratory behavior. The revised PA provides for unlimited pulse protections at the NDD
22 during the primary migration period for juvenile winter-and spring-run Chinook salmon
23 which will reduce the impact to migratory PBFs for these species. (Exhibit SWRCB-106,
24 p. 870)

25 Both the NMFS BO and Dr. Greenwood suggest that “unlimited” pulses flows resolve
26 issues for salmonids migrating past the NDD. Neither recognizes that the issues remain even
27 during pulse flow protection. Neither identifies that prescribed flow pulses would need to be of
28 large magnitude to be effective and would likely require frequent shutdown of the NDD during
natural and reservoir-release pulses in order to meet biological objectives. Neither
acknowledges that the risk to salmonids extends to non-pulse periods when young salmonids
remain even more at risk to the NDD.

1 The NMFS BO also identifies increased risks to migrating salmonids from changes from
2 WaterFix to Delta hydrodynamics:

3 Changes to in-Delta flow are projected to result in routing changes to juveniles of each
4 salmonid species. Entry into the interior Delta is expected to increase under the PA in the
5 months of October, November, June, and sometimes March. Travel time through the
6 Delta is expected to increase for smolts outmigrating from the Sacramento River past the
NDD. (*Id.*)

7 Dr. Greenwood did not address these consequences to winter-run salmon migrating into
8 the Delta in late fall in particular. The effect on the subsequent recruitment of winter-run could
9 be substantial.

10
11 **Dr. Greenwood statement:** *“The last bullet there speaks to a couple of the potential*
12 *effects, so less flow -- less flow in the river, potentially longer travel time and, therefore,*
13 *reduced survival, as well as the predation losses at the North Delta diversions.”* (HT, 2/23/18,
14 p.143:9-13)

15 **Response:** The NMFS BO best described the risk:

16
17 “Increased travel times in the Delta will likely increase risk of predation during
18 outmigration, degrading these PBFs. Unlimited pulse protections at the NDD as part of
19 the revised PA will reduce the degradation of these PBFs relative to smolt outmigration
20 travel time, routing and survival during the primary migration period for winter-run and
spring-run Chinook salmon, which will also apply to a portion of the juvenile steelhead
migration period.” (Exhibit SWRCB-106, p. 872)

21 Again, much of the potential water supply benefit of WaterFix especially in drier years
22 comes during natural flow pulses. Juvenile salmon of various runs migrate during all fall
23 through spring flow pulses, as well as during periods when there are not pulses.

24
25 **Dr. Greenwood statements:** *“And one of these -- these far field effects is changed*
26 *hydrodynamics at the junction with Georgiana Slough, which is an important entry point into*
27 *the --the interior Delta where survival -- where such studies have shown that survival is less of*
28 *juvenile Salmonids migrating through the Delta. And so, as mentioned yesterday, a non-*

1 *physical barrier will be installed at Georgiana Slough at the entrance to Georgiana Slough.*”
2 (HT, 2/23/18, p.143:14-22) *“It's noted in the -- in the Biological Assessment that it's anticipated*
3 *that the -- the potential hydrodynamic effect at the Georgiana Slough junction, meaning the*
4 *potentially greater tidal influence because of less Sacramento River flow coming downstream of*
5 *the North Delta diversions.[sic]”* (HT, 2/23/18, p.144:5-10)

6 **Response:** These comments recognize that NDD will increase the proportion of
7 Sacramento River flow into Georgiana Slough and the Delta Cross Channel (if open). There are
8 no studies that indicate that non-physical barriers would be effective in reducing the risk to
9 migrating salmon in such circumstances.

10
11 **Dr. Greenwood statement:** *“With the tidal habitat restoration that will be undertaken*
12 *that I mentioned for Delta Smelt, as well as other tidal habitat restoration that's being*
13 *undertaken in the Delta as a result of the 2008 Biological Opinion, it's -- it's anticipated that the*
14 *-- that potential effect should not be great.”* (HT, 2/23/18, p.144:11-16)

15 **Response:** There is no basis for this conclusion. The NMFS BO makes no mention of
16 habitat restoration mitigating for CWF effects on salmonids.

17
18 **Dr. Greenwood statement:** *“But there is a performance standard essentially that the*
19 *frequency of regressing flows should not increase above the baseline levels. This is another*
20 *thing that will be looked at and assessed, and, therefore, similar to adaptive management.”* (HT,
21 2/23/18, p.144:17-21)

22 **Response:** This comment out of the blue indicates a willingness or thought of regressing
23 flow effects if habitat restoration does not fulfill the mitigation need. This is certainly a vague
24 commitment for an adaptive management program.

25
26 **Dr. Greenwood statement:** *“If there's a potential need, for example, for more tidal*
27 *habitat restoration, to draw tidal energy away from that junction [mouth of Georgiana Slough],*
28

1 *that that would also be a consideration for the adaptive management.*” (HT, 2/23/18, p.144:22-
2 25)

3 **Response:** This vague commitment to expanding the tidal exchange volume in the north
4 Delta, for example in the Cache Slough area to reduce the percentage of flow into Georgiana
5 Slough, is a big commitment that would likely have little if any benefit unless it were
6 undertaken at a very large scale. A stronger commitment would be to screen the entrance of
7 Georgiana Slough. This further emphasizes the uncertainty in resolving issues relating to
8 Georgiana Slough. (HT, 2/23/18, p.144:22-25)

9
10 **Dr. Greenwood statement:** *“There's an interagency technical team for the North Delta*
11 *diversions. ...that framework with these teams informing final design as well as, you know,*
12 *facilitating assessment and adaptive management I think is a very important component and that*
13 *contributes to my opinion regarding reasonable protection.”* (HT, 2/23/18, p.146:8-9;13-18)

14 **Response:** Large partners in CWF would be hard pressed to accept an open-ended
15 commitment for further capital investment based on the input of advisor teams, especially when
16 the scope of the effort and authority are so vague.

17
18 **Dr. Greenwood statement:** *“Recognizing that potential effect, a total of 4.3 miles of*
19 *channel margin will be restored in order to, as I say, mitigate that potential reduced*
20 *inundation.”* (HT, 2/23/18, p.147:19-22)

21 **Response:** This vague commitment to habitat restoration does not address the risk and
22 uncertainty.

23 **3. Response to Dr. Greenwood’s Presentation on Non-Listed Fish Species**

24
25 **Dr. Greenwood statement:** *“[Regarding white sturgeon] there's a statistical*
26 *relationship with the Delta outflow in the spring -- primarily spring Delta outflow. And this*
27 *showed that the H3+ and the No-Action Alternative were similar. There wasn't a difference*
28 *because of the similarity in spring outflow, which, in my opinion, indicates reasonable*

1 *protection of types and size. The Green Sturgeon may be similarly affected as White Sturgeon.”*
2 (HT, 2/23/18, p.149:4-11)

3 **Response:** The modeling and Mr. Miller’s testimony suggests that CWF will take a big
4 chunk out of winter-spring outflow to the Bay; maybe more so for winter than spring. Like
5 longfin, sturgeon productivity is correlated to winter-spring outflow, not just spring outflow.
6 Regardless, when spring south Delta exports are limited by OMR restrictions, the NDD will be
7 there to make up for the deficit, with a corresponding reduction in outflow.

8
9 **Dr. Greenwood statement:** “[*Real time management*]will also protect these unlisted
10 *Salmonids, as well as the various environmental commitments that I mentioned; for example,*
11 *habitat restoration, Georgiana Slough barrier, and is shown to be necessary through adaptive*
12 *mana -- through more entrainment adaptive management potentially predatory fish relocation*
13 *from the North Delta diversions, for example.”* (HT, 2/23/18, p.151:9-16)

14 **Response:** These are more vague references to other actions that could be done, but no
15 real commitment to do them. Removing predators from the NDD intake areas would be as
16 difficult as removing predators from Clifton Court Forebay. The commitment to protect non-
17 listed salmonids like fall-run is equally vague. Fall-run fry would be at great risk to CWF flow
18 and intake effects; the flow effects of CWF would also reach San Joaquin populations of fall-run
19 whose productivity is related to winter-spring outflow.

20
21 **Dr. Greenwood statement:** *‘It’s my opinion that these other [non-listed fish] species will*
22 *generally be protected by CWF H3+. Again, the same -- same issues as I’ve already described*
23 *for listed fish and unlisted Salmonids.”* (HT, 2/23/18, p.152:14-17; witness is misidentified in
24 HT)

25 **Response:** Because of their timing and distribution risks, fall-run salmon, white sturgeon,
26 splittail, striped bass and American shad are at higher risk than the listed species. See CSPA
27 exhibit 466. Later in his testimony, Dr. Greenwood acknowledges the risks to striped bass and
28 American shad: *“In the EIR/EIS, the only significant and unavoidable impact that we found was*

1 *for Striped Bass and American Shad. This is because of entrainment of early life stages at the*
2 *North Delta diversions.” (HT, 2/23/18, p.156:6-10) Many fish among the non-listed species*
3 *spawn just above the Delta in the Sacramento River or in the lower reaches of its tributaries.*
4 *The eggs, larvae, or fry-juveniles of striped bass, American shad, splittail and white sturgeon*
5 *will be at particularly high risk to the NDD intakes and screens. All depend on flow for*
6 *transport and predator avoidance.*

7 **4. Summary and Final Thoughts on Dr. Greenwood’s Testimony**

- 8
- 9 1. Effect on Delta Smelt – Dr. Greenwood stated that fish screens and their north Delta
10 location would be protective of smelt. He also recognized smelt would be less likely to
11 migrate upstream of the NDD sites than they are known to do under existing conditions.
12 He fails to mention that smelt would be more likely to migrate in winter-spring spawning
13 run upstream into the north Delta via tidal-surfing under lower flows caused by NDD.
14 He fails to mention that all larvae (5-15 mm) and early juvenile (15-20mm) stage smelt
15 approaching the NDD screens would be entrained. He fails to mention that in low-flow
16 years, tidal surfing by adult spawning smelt into the intake reach will likely occur, when
17 the adult smelt would then be blocked from moving further upstream (as he
18 acknowledges). He speculates that 1750 acres of habitat restoration downstream will
19 mitigate for any population effects.
- 20 2. Effect on Delta Habitat –
- 21 a. Dr. Greenwood states there would be little effect on Delta water temperature from
22 lower flows below the NDD. Evidence clearly indicates small but important
23 effects from lower flows as well as a greater effect of warmer San Joaquin
24 contribution, as Dr. Bryan pointed out in his testimony.
- 25 b. Turbidity mitigation is very complicated, and its artificial creation is generally
26 prohibited by state and federal water quality standards. Then there is the
27 composition of fine sediment – organic or inorganic, glacial till or farm runoff –
28

1 and the effect on dissolved oxygen concentrations in the warmer organic-laden
2 San Joaquin water.

3 c. Food-web material in the form of aquatic invertebrates, algae, organic detritus, and
4 essential nutrients taken at the NDD will be considerable, to the direct detriment of
5 north Delta and North Bay habitats. Greater San Joaquin contribution to the south,
6 central, east, and west Delta habitats will increase productivity along with warmer,
7 lower oxygen concentrations, adversely affecting salmon, smelt, and other native
8 fishes, while benefitting non-natives.

9 3. Delta Smelt Fall Rearing Habitat –

10 a. Overall, CWF would tend to move X2 upstream – a big potential impact.

11 Retaining required Fall X2 criteria, while positive, would have limited application;
12 these criteria are subject to relaxation in the rare event that they apply.

13 b. There is no assurance that Dr. Greenwood's stated commitment to reduced
14 operation of the NDD and lower water yield is a DWR commitment, even if FWS
15 determines that additional summer outflow requirements are needed to save the
16 smelt.

17 4. Longfin Smelt – DFW's ITP clearly states that in order to protect longfin smelt, there
18 should be no reductions in winter-spring Delta outflow. However, current existing
19 outflow is the potential source of additional water for CWF. This is why Dr. Greenwood
20 stated that negotiations on the terms of the ITP will determine future Delta winter-spring
21 commitments for Delta outflow.

22 5. Other Fish and Aquatic Species - Most striped bass and American shad spawn upstream
23 of the NDD intakes, and nearly all their eggs or larvae pass directly by the proposed
24 intakes. Juvenile rearing occurs in tidewater, which will be below intakes. Late spring
25 reproduction of striped bass and shad was protected to considerable extent in the 1980's
26 era Peripheral Canal Proposal and D-1485. CWF would be a considerable threat to these
27 species, as well as to non-listed white sturgeon, fall-run salmon, splittail, Sacramento
28 sucker, and other native fishes.

1
2 **B. Response to the Oral Presentation of Testimony by Dr. Wilder**

3 **1. Response to Dr. Wilder’s Presentation on Upstream Fisheries**

4
5 **Dr. Wilder statement:** “*And NMFS ultimately issued, as we know, a – a Biological*
6 *Opinion that indicates no jeopardy and no adverse modification for the listed species.*” (HT,
7 2/23/18, p.171:20-22)

8 **Response:** “No jeopardy” does not mean that NMFS did not anticipate some impacts or
9 habitat effects. “Jeopardy” is a subjective if not a political judgement. In my mind, it should
10 not be used to justify “reasonable protection” for species that have undergone dramatic declines
11 in recent decades.

12 Furthermore, the NMFS BO clearly suggests there will be effects:

13 Under the PA, adverse effects to critical habitat due to elevated temperatures in spawning
14 habitat (RBDD to Keswick Dam) are likely to occur, particularly in drier water years
15 (i.e., the requirements defined in the winter-run PBF ‘water temperatures between 42.5–
16 57.5°F [5.8–14.1°C] for successful spawning, egg incubation, and fry development’ are
17 not being met). It is important to note that adverse effects indicated by the modeling
18 would to some extent be minimized by real-time operational management described in
19 the BA in Section 3.1.5, Real-Time Operations Upstream of the Delta, and Section 3.3.3,
20 Real-Time Operational Decision-Making Process. NMFS does not have sufficient
21 information to specifically describe the extent to which adverse effects indicated by the
22 modeling would be minimized by real-time operations. However, there are extensive
23 real-time operations management processes currently in place for CVP/SWP operations
24 that affect water temperatures upstream of the Delta (see BA 3.1.5.1 Ongoing Processes
25 to support Real-Time Decision Making), those processes have minimized such impacts in
26 the past (Swart 2016), and the PA does not propose changing the existing real-time
27 operational processes. Therefore, NMFS concludes that the real-time operations
28 management process would minimize adverse effects indicated in the modeling for the
PA to a similar extent as the real-time operations process has minimized such impacts in
the past. (SWRCB-106, p. 840, emphasis added)

The record for minimizing adverse effects with “real-time decision-making” in the past is
poor at best. Shasta Reservoir’s cold-water pool ran out in 2014 and 2015, leading to record low
production of juvenile winter-run. Swart did not conclude that real-time operations minimized

1 effects on winter run, only that efforts in 2016 helped reduce effects.¹ Water temperatures are at
2 the heart of salmon problems upstream of the Delta over the past half-century. CWF as
3 proposed will only aggravate the problems, while offering no solutions. No one has provided
4 any idea as to how the issues will be resolved by annual/seasonal management whose record is
5 over the past decade is one of failure. As with other issues, Wilder (following the NMFS BO)
6 simply states that management will fix the problem, regardless of difficulty or conflict with
7 water supply and contractor water allocations.

8 The NMFS BO continues:

9
10 Additionally, the Shasta Operations RPA adjustment described in the BA (Section 3.1.4.5
11 Annual/Seasonal Temperature Management Upstream of the Delta), which is intended to
12 provide more protective temperatures for winter- and spring-run Chinook salmon is in
13 development, and as such, has not been incorporated into the modeling results....Because
14 water temperatures are influenced by air temperatures, NMFS expects that climate
15 change will amplify adverse thermal effects of the PA combined with the environmental
16 baseline and modeled climate change past 2030....For purposes of the analysis in Section
17 2.7 Integration and Synthesis, the combined effect of PA implementation when added to
18 the environmental baseline and modeled climate change impacts is expected to result in
19 substantial degradation to spawning PBFs in critically dry years. As discussed above for
20 Sacramento River winter-run Chinook salmon, it is important to note that adverse effects
21 indicated by the modeling would to some extent be minimized by real-time operational
22 management described in the BA in Section 3.1.5, Real-Time Operations Upstream of the
23 Delta, and Section 3.3.3, Real-Time Operational Decision-Making Process. (SWRCB-
24 106, p. 841-2, emphases added)

25 Dr. Wilder does not address these worsening adverse effects of water temperature under
26 climate change conditions. To suggest that these or other known impacts such as large-scale
27 redd dewatering can be effectively treated with real-time operations and adaptive management is
28 not practical or reasonable.

29
30 **Dr. Wilder statement:** *“And overall, while small differences, again, were observed in
31 some of the model outputs, real-time operations and current modifications of the OCAP RPA,*

32 ¹ <https://news.ucsc.edu/2017/08/brycen-swart-salmon-run.html>

1 *which are currently under -- underway, would be reasonably protective of Salmonids*” (HT,
2 2/23/18, p.173:21-25)

3 **Response:** “Current” refers to recent changes in criteria below Keswick to reduce lethal
4 effects on winter run eggs and embryos. Such benefits have been overcome by the negative
5 effects of moving the temperature compliance point from Red Bluff to Balls Ferry.

6 Dr. Wilder concludes there will be no changes to existing poor water temperature
7 protections for CV salmon and steelhead. Sacramento and American River criteria are often
8 exceeded from spring through fall. Because CWF will alter upstream conditions minimally,
9 then CWF is “reasonably protective”?

10 Model runs use 5000 cfs minimum flow for Wilkins Slough, yet CDFW has suggested
11 7000 cfs would improve water temperatures over existing conditions. Shouldn’t CWF include
12 “reasonable protections” in the event existing conditions are unreasonable?

13 Dr. Wilder suggests that “current modifications” under consideration in the update to the
14 RPA for the BO for SWP and CVP long-term operations (formerly OCAP), including real-time
15 operations, will be protective. However, potential changes to the RPA could greatly affect CWF
16 water yield. Past real-time modifications to the RPA and Order WR 90-05 (SWRCB-24)
17 requirements led to drastic water temperature impacts on salmonids in the Sacramento and
18 American Rivers.

19 The flow rate effects Dr. Wilder analyzed for his testimony were simply a result of water
20 model inputs and algorithms. Specific real-time operational constraints and minimum flows are
21 not part of the CWF proposal. CWF NDD capacity could easily generate demand for upstream
22 storage releases that could affect future flow patterns.

23
24 **Dr. Wilder statement:** “[O]verall, the four analyses indicate that the temperature-
25 related effects to Green and White Sturgeon would be minimal.” (HT, 2/23/18, p.175:23-25)

26 **Response:** There is no mention of Order WR 90-05 or Basin Plan objectives for water
27 temperature being adhered to by WaterFix, nor the past poor record of meeting these objectives.
28

1 The effects on sturgeon of inadequate water temperatures is well documented in Exhibit CSPA-
2 504.

3 **2. Summary and Final Thoughts on Dr. Wilder's Testimony**

- 4
- 5 1. Dr. Wilder concludes that the non-jeopardy conclusion of the NMFS CWF BO is reason
6 enough for him to believe that CWF is reasonably protective.
 - 7 2. Like Dr. Greenwood, Dr. Wilder puts a lot of faith in adaptive management or “real-time
8 decision making or real-time operations management” to protect fish under CWF
9 operations. Both scientists failed to mention the poor record of the agencies’ salmon and
10 smelt technical committees in protecting salmon and smelt.
 - 11 3. Dr. Wilder fails to address potential controls on the CVP from taking advantage of CWF
12 capacities to exploit CVP storage supplies.
 - 13 4. Dr. Wilder fails to adequately analyze past, present, and future effects on salmon or
14 sturgeon from not meeting the requirements of Order WR 90-5 and the Basin Plan.
 - 15 5. Dr. Wilder fails to consider long-term population trends or inherent causes of declines,
16 and attempts to assure all that the populations will be no worse off under the CWF.
- 17

18 Executed this 9th day of July, 2018 at Fair Oaks, California.

19 

20
21 _____
22 Thomas Cannon
23
24
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26
27
28